Brookhaven National Laboratory National Synchrotron Light Source		Number: LS-ESH-0020	Revision: A
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Subject: **Biosafety Requirements at the NSLS**			
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Revision/Review Log

Experimental work with biological materials is ongoing at several NSLS beam lines. Scientists study proteins and nucleic acids with techniques that involve use of cryogens and various laboratory solutions in milliliter quantities. Sample crystals are manipulated and analyzed by individual researchers using procedures that employ standard laboratory precautions for control of the risks presented by this work. This group of biology experiments presents little concern to personnel or the environment as the materials required are easily controlled and the samples under study are harmless.

On occasion, a biology proposal involves work with toxic or infectious samples and these require special planning. Work with bacterial toxins or infectious crystals requires careful evaluation of potential hazards and required controls. Guidelines for precautions needed to work with these biohazardous materials are published by the Centers for Disease Control (CDC). Review of the CDC guidelines with attention to the unique conditions presented by work at our facility has resulted in our decision to restrict biohazardous materials work to materials and procedures that require CDC Biosafety Level 2 (BSL-2) precautions or less. A technical basis for that decision has been defined and includes requirements for both engineering and administrative controls to be included in the planning of all BSL-2 work at the NSLS. There are no plans for advancing to BSL-3 precautions.

Review of experiments for the recognition, evaluation, and control of hazards is also ongoing and recent reviews have helped clarify and refine our requirements for experiments that present biosafety concerns. Researchers working with biohazardous samples must understand the risks presented by their experiment and provide a written plan for control of those risks. Each experiment that involves biohazardous samples must receive individual review and approval before work at the Light Source begins. An outline of expected requirements for BSL2 work follows.

- Researchers are expected to know and follow standard microbiology laboratory precautions.
- A careful inventory is required to assure that all samples are either destroyed or returned to the User's home institution at the end of each experiment.
- Only one crystal may be manipulated at any time. Other crystals are to remain in storage.
- All work must be restricted to the X-ray hutch or to a small defined area in close proximity to the hutch.
- Work areas must be posted with biohazard signs.
- The BSL-2 samples must be under the constant supervision of a Researcher for the duration of the experiment. Arrangements for securing samples in locked containers may be made should all members of the research group need to leave the beam line.

- Researchers working with BSL-2 samples must have academic credentials beyond the bachelor's degree level and must have at least 1 year of experience working with BSL-2 materials.

- Samples must be transported in sealed containers with secondary containment in accordance with US Department of Transportation (DOT) rules.

- A disinfectant, such as ethanol, isopropanol, or hypochlorite solution, must be available and all surfaces in the vicinity of the samples must be routinely disinfected during the experiment and at the completion of the experiment.

- Surfaces directly under the sample manipulation and storage areas must be covered with adsorbent pads to capture spills.

- Researchers must wear gloves, lab coats, and eye protection while manipulating samples. Disposable latex or nitrile gloves are acceptable. Gloves must be removed and replaced often and whenever immersed or splashed with solvents used for disinfection or contaminated with BSL2 material. Laboratory coats and gloves are to be removed and left near the work area when leaving the work area.

- At least two Researchers must be present at all times when BSL2 materials are in use. Each must be familiar with the procedures and risks, maintain visual contact with the other, and be prepared to assist in the event of an accident.

- The NSLS Control Room must be notified of any spills or loss of control of any sample.

- Procedures that may produce an aerosol of BSL-2 material are prohibited. Mounting of warm crystals at the NSLS is prohibited. Only frozen crystals may be brought to the NSLS and placed in the synchrotron beam. Work with warm crystals presents an unacceptable risk of either losing a crystal or creating an aerosol.

- No extended storage of BSL-2 materials is allowed at the NSLS. At the completion of an experimental run, all BSL-2 materials must either be disposed or return to the Researcher's home institution.

- Equipment, adsorbent pads, and gloves that may have contact with BSL2 materials must be disposed as biohazardous wastes. Specific arrangements must be made with the BNL Medical Department for this disposal.